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The effects of solar and terrestrial magnetism upon the motions of the Sun and Earth are no doubt negligible for the present, but may it not be that similar forces under other cosmical conditions are highly effective? Consider the case of a close spectroscopic binary system, whose period of revolution is only a few hours or only a few days. We have very strong reasons for believing that the two massive components are rotating on axes essentially parallel, in the same direction with reference to their surroundings, once in each revolution period. If the rotation of a sun or a planet is an important factor in developing its magnetic field, may not the two rapidly-rotating components of the double-star system be magnets of great strength? Is it not probable, further, that they are of like polarity, since they are rotating in the same direction? Further, as the two bodies are separated by a minute distance, may not their magnetic forces, presumably repellant, be effective in causing their orbits to grow larger. DARWIN, POINCARÉ, and SEE have contributed to the widely accepted theory that a stellar mass rotating ever more rapidly to keep pace with decreasing diameter as a result of heat loss, may divide into two components, which continue to revolve around their center of mass in orbits growing larger and larger by virtue of tidal interactions, all operating according to NEWTON's law and the laws of friction. More recent investigators have questioned the sufficiency of tidal interactions to account for the apparent separation of the two components of a double star beyond certain limits. Might it not be well to make quantitative study of repellant magnetic forces in double-star formation and development, based upon hypothetical cases in harmony with existing knowledge concerning spectroscopic and visual double-star systems.

W. W. CAMPBELL.

May 1, 1913.

RECENT CHANGES IN LICK OBSERVATORY APPOINTMENTS.

Dr. JOSEPH H. MOORE, Acting Astronomer in the Lick Observatory, who is in charge of the D. O. Mills Expedition to the southern hemisphere at Santiago, Chile, will return to Mount Hamilton as Assistant Astronomer late in the summer

of 1913. Dr. MOORE has been in charge of the work in Chile during the past four years.

Dr. RALPH E. WILSON, Assistant in the Lick Observatory during the past two years, has been appointed Assistant Astronomer in charge of the D. O. Mills Expedition in succession to Dr. MOORE.

Dr. WILSON and Miss MARY ADELAIDE MACDONALD were married in the library of the Lick Observatory on May 20th. Mrs. WILSON was the first child born to parents of the Lick Observatory community, and Mount Hamilton has been her home since childhood. Dr. and Mrs. WILSON will sail from San Francisco on June 30th by the Pacific Mail S. S. "Pennsylvania" for Panama and Valparaiso.

Mr. ROSCOE F. SANFORD, for the past two years Assistant in the work of the D. O. Mills Expedition at Santiago, Chile, has been appointed Assistant Astronomer for longer residence in Chile. Before appointment to the D. O. Mills Expedition, Mr. SANFORD was Carnegie Assistant in the Lick Observatory for two years, with residence at Mount Hamilton, and, following this term, served for three years in the Carnegie Meridian Observatory at San Luis, Argentina, as Assistant to Astronomer TUCKER.

Dr. ELI STUART HAYNES has been appointed Martin Kellogg Fellow in the Lick Observatory for the academic year 1913-14, with residence at Mount Hamilton. Dr. HAYNES was on the staff of the Laws Observatory, University of Missouri, for several years; during the past two years he has been a graduate student in the University of California, and during the current year an instructor on the staff of the Students' Observatory. His thesis, in completion of requirements for the degree of Doctor of Philosophy in the University of California, relates to the orbit of the minor planet 1911 MT (719) *Albert*. An abstract of this thesis appears in the present number of these *Publications*.

Miss RUTH STANDEN, Secretary of the Lick Observatory, has been granted leave of absence for six months for travel in Europe in the latter half of this year. Miss CLARICE L. DAVIS has been appointed Secretary *ad interim*.

Dr. PAUL WILLARD MERRILL, Assistant in the Lick Observatory during the years 1909-10 and Fellow in the Lick Observatory during the academic years 1910-13, has been appointed instructor in astronomy in the University of Michigan. Dr. MERRILL's thesis, in completion of requirements for the degree of Doctor of Philosophy in the University of California, conferred on May 14th, related to "Class B Stars Whose Spectra Contain Bright Hydrogen Lines." An abstract of this thesis appears in this number of the *Publications*, and the thesis in full will form a Lick Observatory *Bulletin*.

Dr. CARL CLARENCE KIESS, Fellow in the Lick Observatory during the academic years 1910-13, has been appointed instructor in astronomy in the University of Missouri. His thesis, in completion of requirements for the degree of Doctor of Philosophy in the University of California, conferred on May 14th, is based upon an investigation of the cluster variable, RR Lyræ. An abstract of the thesis appears in this number of the *Publications*, and the thesis will form the contents of a Lick Observatory *Bulletin*.

Dr. EMMA PHŒBE WATERMAN, Vassar College Fellow in the Lick Observatory during the academic year 1912-13, has been appointed assistant in the Argentine National Observatory at Córdoba. Her thesis, in completion of requirements for the degree of Doctor of Philosophy in the University of California, conferred on May 14th, consisted of a study of the visual region of spectrum in the brighter Class A stars of the northern sky. An abstract of the thesis results appears in the present number of these *Publications*, and the thesis as a whole will be published as a Lick Observatory *Bulletin*.

Mr. JOHN HIMES PITMAN, Joshua Lippincott Fellow in the Students' Observatory, University of California, during the academic year 1911-12, and Fellow in the Lick Observatory during the current year, has been appointed instructor in mathematics and astronomy in Swarthmore College.

W. W. CAMPBELL.

APPROPRIATION FOR THE LICK OBSERVATORY.

The Legislature of the State of California has unanimously appropriated the sum of \$50,000 to cover the expense of construction of a three-story concrete dormitory and two frame cottages, in replacement of residence space which was destroyed by the earthquake of July 1, 1911. Expenses on account of minor damages to substantially all the buildings on Mount Hamilton, to the clocks, domes, etc., in excess of the above appropriation, have been met from other funds. The new residence space will be ready for occupation in June of this year.

W. W. CAMPBELL.

THE RIEFLER CLOCK OF THE LICK OBSERVATORY.

The Riefler sidereal clock was first mounted at the observatory in November, 1906. It was finally sealed, after rating, in June, 1907. A description of the clock, and of its performance to the end of 1907, was given in these *Publications*, volume XX, page 29.

The original lower glass cylinder, forming one of the two enclosing bells, later developed serious cracks. The most pronounced were those radiating from the metal insert, where the wires enter the case, for the electric wind, and for the chronograph connection with the break circuit. Other small cracks surround the upper edge of the bell where it rested upon the iron supporting bracket. These cracks were probably the effect of expansion and contraction of the glass and metal under temperature variation. The range of temperature in the clock chamber, in the basement of the meridian-circle building, is about 30° in the course of the year.

Since these cracks allowed entrance to air, the special design of keeping the clock under constant air pressure was defeated, and a new lower case was accordingly ordered from Munich. The new glass bell was broken in the earthquake shock of July 1, 1911, when the pendulum was thrown off its supporting carriage, and fell down through the bottom of the case; fortunately without injuring the works of the clock in any way.